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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,784	09/29/2006	Hideyuki Ono	121036-0096	7107
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BUTZEL LONG				
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SUITE 300				
ANN ARBOR, MI 48104				
EXAMINER				
REDDY, KARUNA P				
ART UNIT		PAPER NUMBER		
1796				
NOTIFICATION DATE		DELIVERY MODE		
03/25/2009		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATENT@BUTZEL.COM  
BOUDRIE@BUTZEL.COM

### Office Action Summary

**Application No.**

10/594,784

**Applicant(s)**

ONO ET AL

**Examiner**

KARUNA P. REDDY

**Art Unit**

1796

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 10, 12 and 14-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10, 12 and 14-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 2/9/2009 has been entered. Claim 1 is amended; claims 9, 11 and 13 are cancelled; and claims 14-16 are added. Accordingly, claims 1-8, 10, 12 and 14-16 are currently pending in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 103***

3. Claims 1-8, 10, 12, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriyama et al (US 6, 156, 849) in view of Hiramatsu et al (JP 61-171737) and Ueshima et al (US 5,502,095).

Moriyama et al disclose an acrylic elastomer composition, which comprises an acrylic elastomer obtained by copolymerization with 0.1 to 10% by weight of fumaric acid mono-lower alkyl ester on the basis of total monomer mixture, and an aromatic diamine compound vulcanizing agent. It is effectively applicable as a vulcanization molding material for seal members or hose members (abstract). Fumaric acid mono-lower alkyl

ester-containing acrylic elastomer can be further copolymerized with other vinyl or olefinic monomer (column 3, lines 9-11). The aromatic diamine compound can be used in an amount of about 0.1 to about 5 parts by weight per 100 parts by weight of the fumaric acid mono-lower alkyl ester-containing acrylic elastomer (column 3, lines 52-56). The acrylic elastomer can be further admixed with a reinforcing agent, a filler, an antioxidant etc, if necessary (column 4, lines 17-21). Its vulcanization molding can be carried out by compression molding, injection molding, transfer molding etc (column 4, lines 28-29). The fumaric acid mono-lower alkyl ester-containing acrylic elastomer can be admixed with an aromatic diamine compound vulcanizing agent (column 3, lines 33-36).

Moriyama et al is silent with respect to thiazole-based compound, amine based antioxidant, mixture of amine-based/phenol-based antioxidant and thiazole; amount of thiazole based compound; and the wall thickness of molded-article, such as gasket or o-ring, of not more than 30 mm.

However, Hiramatsu teaches subjecting elastomer to crosslinking with S or S-containing compounds. The sulfur containing compounds include thiazoles such as mercaptobenzothiazole or dibenzothiazyl disulfide. The crosslinked material obtained has low permanent compressive strain and high heat resistance while maintaining excellent workability and moldability characteristic of S-crosslinked material (abstract). Furthermore, Ueshima et al teach elastomeric composition comprising rubber and has improved flexibility and compression set (abstract). The rubber includes hydrogenated acrylic acid ester-butadiene copolymer rubber (column 5, lines 21-26). The compatibility can be further enhanced by introducing functional group such as a carboxyl group (column 5, lines 35-37) which is effected by copolymerizing monomers such as acrylic

acid (column 5, lines 40-44). The elastomeric composition can contain additives such as antioxidants in combinations of two or more and includes amine type antioxidants (column 9, lines 62-65), phenol-type antioxidants (column 10, line 17), and imidazole type antioxidants such as zinc salt of 2-mercaptobenzothiazole (column 10, line 14). Therefore, it would have been obvious to one skilled in the art at the time invention was made to add thiazole and another antioxidant (amine-based or phenol-based) to the acrylic elastomer composition of Moriyama et al, because Hiramatsu et al teach that thiazoles can be added to elastomeric compositions to improve the compression set while Ueshima et al teach that a combination of two or more antioxidants including amine-type, phenol-type and thiazole antioxidants can be added to elastomeric compositions and one skilled in the art would have been motivated to add thiazole and another antioxidant, based either on phenol or amine, to the elastomeric compositions of Moriyama et al for improving compression set while inhibiting oxidative degradation during the vulcanization process.

With respect to the amount of thiazole, while neither reference elucidates that value, it is the examiner's position that thiazole amount is a result-effective variable (MPEP 2144.5) since the amount used clearly affects permanent compressive strain, heat resistance, crosslinking density and oxidative degradation. Hence, the choice of a particular amount of thiazole (such as the amount in present claims) is a matter of routine experimentation and would have been well within the skill level of, and thus obvious to, one of ordinary skill in the art.

With respect to the wall thickness, given that the composition, of Moriyama et al in view of Hiramatsu and Ueshima et al, is substantially similar to that of the present claims and the use of vulcanized molding material as a seal member (reads on gaskets

or o-rings) is recognized (abstract) by Moriyama et al, it would have been within the scope of a skilled artisan to mold the article to a desired thickness (such as the thickness in present claims) depending on the end use requirements.

***Response to Arguments***

4. Applicant's arguments filed 2/9/2009 have been fully considered but they are not persuasive. Specifically, (A) while referring to examples (1 and 8) and comparative examples (1 and 2) of present invention, applicant argues that compression set of O-ring having a 5 mm wire diameter cannot be improved without a thiazole-based compound; (B) Hiramatsu et al fails to teach a carboxyl group-containing acrylic elastomer; (C) Moriyama et al fails to teach the use of a thiazole-based compound and Hiramatsu et al provides comparative examples that demonstrate that addition of thiazoles will deteriorate the compression set characteristics;

With respect to (A), applicant's attention is drawn to the table, in present disclosure, which is provided below for convenience -

TABLE

Items of determination	Example No.								Comp. Ex. No.	
	1	2	3	4	5	6	7	8	1	2
<u>[Mooney viscosity Search]</u>										
MLmin (pts)	29	28	27	29	28	28	27	32	28	33
t <sub>5</sub> (min.)	5.5	5.6	5.9	5.6	5.5	5.4	5.6	3.7	5.6	3.4
<u>[Normal state physical properties]</u>										
Hardness (Duro A)	53	53	53	53	53	53	53	54	53	54
100% Modulus (MPa)	4.3	4.1	4.2	4.3	4.2	4.3	4.4	4.9	4.2	5.4
Tensile strength (MPa)	8.8	9.0	8.4	9.1	9.3	9.0	9.2	9.5	8.8	9.2
Elongation (%)	205	215	210	200	205	200	210	230	210	210
<u>[Compression set]</u>										
Block	70 hrs (%)	9	8	8	9	9	8	9	9	9
	300 hrs (%)	17	16	15	20	18	16	16	18	15
	600 hrs (%)	26	24	23	26	25	24	23	25	23
O ring	70 hrs (%)	17	17	16	19	19	17	10	18	12
	300 hrs (%)	35	32	30	38	35	33	23	38	29
	600 hrs (%)	54	49	46	52	55	50	35	60	42

As can be seen from data, compression set of comparative examples 1 and 2 are close to those for inventive examples 1-8 in the table. For e.g., compression set of 18 and 38 (comparative example 1) is comparable to compression set of 19 and 38 (example 4) at 70 hrs and 300 hrs respectively, while a compression set of 55 (inventive example 5) is comparable to that of 60 (comparative example 1) at 600 hrs. Furthermore, inventive examples (1 and 8) and comparative examples (1 and 2) use 2-mercaptobenzothiazole in amounts of 0.5 and 2 parts by weight respectively, as the thiazole based compound and is not commensurate with scope of present claims. In addition, given that the

compression set of comparative examples is similar to that obtained using other thiazoles presently claimed (i.e. comparative examples have the desired compression set), applicant's arguments with respect to alleged showing of unexpected results are not persuasive.

With respect to (B) as stated earlier in paragraph 6B of office action mailed 4/22/2008, Hiramatsu et al is a secondary reference and it is not necessary that it contain all the limitations of a primary reference and/or instant claims. The primary reference of Moriyama et al does teach acrylic elastomers containing carboxyl group. Hiramatsu et al is used in the rejection for its teaching that addition of thiazoles, such as 2-mercaptobenzothiazoles, to elastomers results in an elastomer with low compression set and high heat resistance while maintaining excellent workability and moldability. It is the examiner's position that while Hiramatsu's disclosure is not made in the context of carboxy-functionalized acrylic elastomers, nevertheless since it describes at least one embodiment of a functionalized acrylic elastomer and there is no evidence of record to contraindicate that Hiramatsu's teaching cannot be extended to other functionalized acrylic elastomers, the combination of Moriyama et al and Hiramatsu et al is sound and proper.

With respect to (C), as stated earlier in paragraph 6C of office action mailed 4/22/2008, applicant's attention is drawn to example 1 and example 3, of Hiramatsu et al, wherein it is shown that addition of 2-mercaptobenzothiazole to a crosslinkable elastomer improves compression set, of the elastomer, when irradiated. Thus, addition of thiazoles of Hiramatsu et al to acrylic elastomer of Moriyama et al is prima facie obvious because the present claims are drawn to an acrylic elastomer composition and the process claims do not require specific conditions for crosslinking.



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KARUNA P. REDDY whose telephone number is (571)272-6566. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. P. R./  
Examiner, Art Unit 1796

/Vasu Jagannathan/  
Supervisory Patent Examiner, Art Unit 1796